FINAL REPORT

EXECUTIVE SUMMARY

FEASIBILITY STUDY FOR INSTALLATION OF UMCS FORT RILEY, KANSAS

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

Prepared for

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LIST OF ABBREVIATIONS

ACC	-	air cooled condenser
ACCU	-	air cooled condensing unit
ACU	-	auxiliary control unit
AHU	-	air handling unit
AI	-	analog input
ANSI	-	American National Standards Institute
AO	-	analog output
BLR	-	boiler
Btu	-	British thermal unit
CDP	-	condensate pump
CH	-	chiller
CNW	-	condenser water
CNWR	-	condenser water return
CNWS	-	condenser water supply
COE	-	Corps of Engineers
COS	-	control operator station
CV	-	converter
CW	-	chilled water
CWP	-	chilled water pump
CWR	-	chilled water return
CWS	-	chilled water supply
EZDOE	-	Computer program used for calculating building hour energy use.
DD	-	dual duct
DDC		direct digital control
DHW	-	domestic hot water
DI	-	digital input
DISC	-	discounted
DO	-	digital output
DOIM	-	Directorate of Information Management
DTM	-	data transmission media
DTW	-	dual temperature water
DTWP	-	dual temperature water pump
DX	-	direct expansion
ECO	-	Energy Conservation Opportunity
EMC	-	E M C Engineers, Inc.

EMCS	-	energy monitoring and control system
F	-	fahrenheit
FC	-	fan coil
FO	-	fiber optic
ft	-	foot, feet
ft^2	-	square feet
gal	-	gallons
gpm	-	gallons per minute
hp	-	horsepower
hr	-	hour
HRU	-	heat recovery unit
HW	-	hot water
HWP	-	hot water pump
HWR	-	hot water return
HWS	-	hot water supply
H&V	-	heating and ventilating
IR	-	infrared radiant
JC	-	Johnson Controls
kW	-	kilowatt, one thousand watts
kWh	-	kilowatt-hours, one thousand watt-hours
lb/hr	-	pounds per hour
LCCA	-	life cycle cost analysis
MAU	-	make-up air unit
MBtu	-	million British thermal units
MZ	-	multizone
O&M	-	operation and maintenance
OA	-	outside air
PC	-	personal computer
psia	-	pounds per square inch absolute
psig	-	pounds per square inch gage
PW	-	Public Works
RA	-	return air
RAD	-	radiation heating system
RAF	-	return air fan
RCU	-	remote control unit
rpm	-	revolutions per minute
SIR	-	Savings-to-Investment Ratio

SOW	-	scope of work
sq ft	-	square foot
STM	-	steam
SVGS	-	savings
SZ	-	single zone
temp.	-	temperature
UCU	-	unitary control unit
UH	-	unit heater
UMCS	-	utility monitoring and control system
VAV	-	variable air volume
VSD	-	variable speed drive
WAC	-	window air conditioner
yr	-	year(s)

EXECUTIVE SUMMARY

OBJECTIVE

The Feasibility Study for Installation of UMCS at Fort Riley was performed as part of the Energy Engineering Analysis Program (EEAP) for the Kansas City District Corps of Engineers. The purpose of this feasibility study is to determine the economic feasibility of replacing the existing UMCS with a Utility Monitoring and Control System (UMCS) and adding additional buildings to the UMCS. The existing pneumatic controls would be replaced with direct digital controls.

PROPOSED UMCS

A total of 214 buildings were analyzed to determine the economic benefits of UMCS monitoring and control. Three alternative UMCS configurations were evaluated in this study at the Interim Submittal. Alternative 1 discussed replacement of the existing JC/85/40 EMCS with a new JC Metasys UMCS via implementing a sole source contract for the UMCS. The evaluation investigated the possibility of a higher contract cost for material and labor due to implementing a sole source contract. Alternative 2 discussed installation of a new UMCS in parallel with the existing JC/85/40 EMCS, thus ending up with two separate control systems for the buildings evaluated. Alternative 3 discussed installation of a new UMCS for the buildings evaluated in the study, replacing the existing JC/85/40 EMCS.

Alternative 1 was evaluated to introduce the potential results of implementing a sole source contract for the UMCS without a competitive bidding environment. Based on the discussion at the Interim Submittal review conference, this alternative was eliminated from the study.

Alternative 2 was evaluated to investigate the possibility of reusing the existing EMCS. The existing EMCS is currently used to its capacity and is ten year old technology. A new UMCS is recommended to provide better and more reliable control, therefore, this alternative was eliminated from the study.

Alternative 3, the installation of a new UMCS, is recommended and the evaluation is presented in this study as the proposed UMCS.

The proposed UMCS would replace the existing JC/85/40 EMCS and include new buildings which are economically feasible on the UMCS. The following items were evaluated:

- Install new front-end computer equipment for new UMCS.
- Install new field panels, UMCS points, and control wiring in the existing 23 buildings and new buildings.

- Install FO DTM to existing and new buildings.
- Install new software and provide programming for the data base and control sequences.

METHODOLOGY

The heating, ventilation, and air-conditioning (HVAC) systems in each of the 214 buildings were analyzed for the appropriate utility management functions and evaluated for energy savings and manpower cost savings associated with these functions. Construction costs were determined for installation of the utility management functions on the HVAC systems. The construction costs and energy savings were summarized for each building and an economic evaluation was performed. The buildings were ranked in order of priority according to the savings-to-investment ratio (SIR) of each building. A project life cycle cost analysis (LCCA) was then performed for the proposed UMCS.

UMCS OPERATIONS AND MAINTENANCE

The existing UMCS at Fort Riley is currently operated and maintained by trained UMCS operators. It is recommended that additional training for the UMCS operators be required to operate and maintain the proposed UMCS. UMCS operators should be familiar with the new UMCS hardware and software and be able to maintain and troubleshoot the new system. Continuing maintenance of UMCS equipment is essential if the maximum benefits of the system are to be realized.

BUILDING SUMMARY

The results of the building-by-building analysis for the proposed UMCS are summarized in Table ES-1, beginning on page ES-3. The building economic summary table ranks the buildings from highest to lowest SIR. Those buildings with SIRs less than 1.25 were summed and reported as non-qualifying buildings. The non-qualifying building totals were subtracted from the totals for all buildings to determine the totals for qualifying buildings.

Table ES-1. Building Economic Summary

BLDG NO	BLDG NAME	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
6914	EXC MAIN RETL	222	425,289	12,797	29	$76,642	20	24	11	49	104	$21,172	$2,810	$23,982	$710,871	29.64	0.31
0403	ADMIN GEN PURP	0	219,576	664	12	$12,094	6	0	6	4	16	$3,970	$1,034	$5,004	$108,166	21.62	0.41
0500	POST HQ BLDG	0	329,263	2,396	10	$23,711	9	0	11	13	33	$9,065	$1,034	$10,099	$215,523	21.34	0.43
4010	DENTAL CLINIC	70	265,252	2,494	22	$23,545	10	8	9	19	46	$9,507	$1,347	$10,854	$213,857	19.70	0.46
0210	MILIT PERS BLDG	169	879,865	4,208	30	$58,707	14	33	9	59	115	$23,944	$2,947	$26,891	$527,189	19.60	0.46
7285	CLOTHING SALES	38	134,509	3,177	15	$19,969	7	5	5	18	35	$9,017	$1,073	$10,090	$184,815	18.32	0.51
8063	ENL PERS DIN	42	155,912	1,591	8	$14,249	3	9	2	15	29	$6,056	$1,034	$7,090	$129,706	18.29	0.50
7866	THEATER W/DRESS RM	46	166,101	1,678	16	$15,332	8	6	6	15	35	$6,933	$1,210	$8,143	$139,408	17.12	0.53
7832	GYMNASIUM	0	16,566	4,706	8	$20,264	9	7	6	30	52	$10,157	$1,210	$11,367	$192,409	16.93	0.56
7632	GYMNASIUM	0	16,566	4,627	8	$19,940	9	7	6	30	52	$10,157	$1,210	$11,367	$189,327	16.66	0.57
0200	ADMIN GEN PURP	0	290,211	2,111	20	$21,162	12	0	16	14	42	$10,852	$1,269	$12,121	$192,208	15.86	0.57
0808	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
0802	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
7024	GYMNASIUM	0	16,566	4,623	8	$19,922	9	7	6	30	52	$10,157	$1,928	$12,085	$189,156	15.65	0.61
0206	ADMIN GEN PURP	50	103,133	1,316	15	$11,303	7	3	6	12	28	$5,371	$1,269	$6,640	$102,897	15.50	0.59
6940	INDOOR SWIM POOL	0	98,409	1,196	7	$9,159	6	2	3	12	23	$4,500	$1,210	$5,710	$84,071	14.72	0.62
0205	CAVALRY MUSEUM	3	141,302	1,221	16	$11,320	4	7	4	16	31	$6,460	$1,269	$7,729	$103,052	13.33	0.68
6620	COMMUN ACT CTR	148	212,488	2,701	19	$24,120	10	16	10	34	70	$14,849	$2,010	$16,859	$219,062	12.99	0.70
0509	ADMIN GEN PURPOSE	0	39,438	370	0	$3,153	1	0	1	2	4	$1,213	$1,034	$2,247	$28,831	12.83	0.71
7665	DENTAL CLINIC	45	131,606	983	13	$10,940	4	8	7	14	33	$7,005	$1,164	$8,169	$98,729	12.09	0.75
0820	TAC EQUIP SHOP	25	144,124	1,030	7	$11,003	7	6	3	21	37	$7,285	$1,052	$8,337	$99,592	11.95	0.76
7670	DENTAL CLINIC	71	112,911	1,297	13	$12,130	7	8	8	16	39	$8,123	$1,164	$9,287	$109,977	11.84	0.77
0202	PHYS FITNESS CTR	46	77,018	2,760	18	$16,168	14	8	7	33	62	$11,910	$1,269	$13,179	$150,075	11.39	0.82
0741	MNT HANGAR COMB	0	62,035	2,677	26	$14,214	4	8	4	20	36	$11,066	$1,164	$12,230	$132,917	10.87	0.86
8071	RGT HQ BUILD	15	131,511	300	8	$7,238	2	8	2	11	23	$4,895	$1,034	$5,929	$64,332	10.85	0.82
5800	YOUTH CTR	79	191,057	1,422	23	$16,314	10	11	10	25	56	$11,764	$2,147	$13,911	$146,990	10.57	0.85
0319	GEN INSTR BLDG	32	76,592	499	10	$6,275	5	3	4	10	22	$4,372	$1,128	$5,500	$56,372	10.25	0.88
8330	VEH MNT SHOP ORG	10	159,847	1,620	10	$13,768	10	7	6	25	48	$10,369	$2,010	$12,379	$125,765	10.16	0.90
0405	ADMIN GEN PURP	58	79,203	1,169	11	$9,832	5	2	7	19	33	$7,949	$1,034	$8,983	$89,499	9.96	0.91
8100	CONSOLIDATED MNT	115	1,581,158	10,388	59	$112,445	64	58	31	179	332	$77,305	$26,040	$103,345	$1,018,279	9.85	0.92
0722	FLIGHT SIMULATOR	62	255,249	870	17	$16,105	7	10	8	31	56	$11,164	$3,724	$14,888	$143,595	9.64	0.92
5302	POST OFFICE	45	134,508	367	15	$8,586	5	8	5	15	33	$6,765	$1,347	$8,112	$76,141	9.39	0.94
7264	LIBRARY MAIN	94	195,808	1,161	14	$15,609	9	15	7	32	63	$13,104	$1,873	$14,977	$139,947	9.34	0.96
0203	CAVALRY MUSEUM	54	64,425	589	14	$6,801	8	4	5	12	29	$5,696	$1,269	$6,965	$61,104	8.77	1.02
7854	BN HQ BLDG	74	105,963	143	11	$7,119	5	4	6	14	29	$6,107	$1,164	$7,271	$62,406	8.58	1.02
5315	MORRIS HILL CHAPEL	132	160,451	676	22	$13,309	14	3	16	21	54	$12,413	$1,347	$13,760	$117,972	8.57	1.03
7485	BOWLING ALLEY	116	309,641	1,303	20	$21,589	10	12	8	34	64	$15,521	$7,244	$22,765	$192,718	8.47	1.05
7638	BN ADMIN & CLRM	36	105,513	207	12	$6,421	4	7	4	12	27	$5,524	$1,210	$6,734	$56,712	8.42	1.05
8069	IN SW POOL/GYM	12	148,240	2,669	12	$17,725	16	21	4	47	88	$18,147	$1,834	$19,981	$163,722	8.19	1.13
0406	CID BLDG	28	65,052	700	12	$6,568	3	9	5	13	30	$6,336	$1,034	$7,370	$59,579	8.08	1.12

BLDG NO	BLDG NAME	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
7624	BN ADMIN & CLRM	36	111,987	219	12	$6,739	4	8	4	14	30	$6,195	$1,210	$7,405	$59,544	8.04	1.10
7108	BN ADMIN & CLRM	12	97,067	281	11	$5,727	3	8	3	11	25	$5,281	$1,210	$6,491	$51,008	7.86	1.13
7630	BN ADMIN & CLRM	36	108,687	213	12	$6,579	4	8	4	14	30	$6,195	$1,210	$7,405	$58,124	7.85	1.13
0222	ADMIN GEN PURP	34	70,345	484	11	$6,043	6	3	6	12	27	$5,610	$1,347	$6,957	$54,266	7.80	1.15
0602	DENTAL CLINIC	67	161,751	555	18	$11,104	12	9	9	22	52	$10,651	$2,147	$12,798	$98,668	7.71	1.15
7856	ENL PERS DIN	77	72,397	1,158	8	$9,927	8	9	7	26	50	$10,545	$1,164	$11,709	$90,196	7.70	1.18
7865	UNIT CHAPEL	46	79,893	461	13	$6,682	7	3	6	15	31	$6,676	$1,098	$7,774	$59,719	7.68	1.16
7804	ENL PERS DIN	80	68,819	1,158	8	$9,839	8	9	7	26	50	$10,545	$1,098	$11,643	$89,410	7.68	1.18
7806	BN HQ BLDG	74	105,963	142	11	$7,114	6	5	7	15	33	$7,065	$1,098	$8,163	$62,363	7.64	1.15
7920	VEH MNT SHOP DS	48	344,189	4,073	21	$32,721	31	32	13	98	174	$36,562	$3,610	$40,172	$299,449	7.45	1.23
7620	BN ADMIN & CLRM	25	74,734	435	12	$5,796	4	8	4	14	30	$6,195	$1,210	$7,405	$52,002	7.02	1.28
7218	BN HQ BLDG	37	97,887	331	13	$6,659	5	8	6	16	35	$7,433	$1,073	$8,506	$59,180	6.96	1.28
0853	MNT HANGAR AVUM	22	196,818	1,082	16	$13,532	15	17	6	46	84	$16,600	$1,052	$17,652	$121,917	6.91	1.30
8380	VEH MNT SHOP ORG	67	385,062	1,639	15	$24,727	24	29	9	78	140	$29,369	$2,764	$32,133	$221,649	6.90	1.30
8410	VEH MNT SHOP ORG	67	385,062	1,764	15	$25,244	24	29	9	78	140	$29,369	$3,610	$32,979	$226,578	6.87	1.31
8390	TAC EQUIP SHOP	11	98,598	945	10	$8,495	9	8	5	26	48	$10,439	$1,073	$11,512	$77,373	6.72	1.36
0330	DEH ADMIN	24	116,801	618	18	$8,407	12	12	6	24	54	$10,128	$1,128	$11,256	$75,468	6.70	1.34
7836	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
7824	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
0814	MEDICAL FAC - NEW	30	80,234	549	19	$6,801	7	8	8	17	40	$8,389	$1,052	$9,441	$61,104	6.47	1.39
0835	MAF OPS BLDG	32	165,403	367	11	$9,424	3	4	3	15	25	$6,738	$6,332	$13,070	$83,606	6.40	1.39
0817	MNT HANGAR AVUM	18	240,516	553	19	$13,122	16	15	7	46	84	$16,442	$1,852	$18,294	$116,693	6.38	1.39
7017	BN HQ BLDG	8	26,027	152	3	$1,988	2	2	1	4	9	$1,688	$1,128	$2,816	$17,851	6.34	1.42
0029	RED CROSS BLDG	11	23,529	416	6	$3,104	4	4	2	8	18	$3,376	$1,128	$4,504	$28,431	6.31	1.45
6910	EXC SP ST FAC	8	14,588	514	6	$3,078	4	4	2	8	18	$3,376	$1,210	$4,586	$28,526	6.22	1.49
7820	BN ADMIN & CLRM	22	65,750	382	12	$5,135	4	8	4	14	30	$6,195	$1,210	$7,405	$46,052	6.22	1.44
7212	CO HQ BLDG	2	38,414	820	6	$5,151	7	4	3	18	32	$6,629	$1,073	$7,702	$47,715	6.20	1.50
8360	VEH MNT SHOP ORG	6	80,015	1,874	12	$11,463	12	14	6	40	72	$15,188	$2,010	$17,198	$106,325	6.18	1.50
7270	BN HQ BLDG	26	62,563	417	15	$5,315	4	9	4	15	32	$6,651	$1,073	$7,724	$47,698	6.18	1.45
0724	FLIGHT SIMULATOR	40	130,611	553	23	$9,249	10	11	11	24	56	$11,516	$1,964	$13,480	$82,520	6.12	1.46
7086	UNIT CHAPEL	34	56,713	555	16	$5,876	6	3	7	19	35	$7,817	$1,128	$8,945	$52,992	5.92	1.52
1470	AR VEH MNT SHOP	10	113,444	891	14	$8,937	11	6	8	24	49	$10,520	$3,280	$13,800	$81,071	5.87	1.54
0302	FINANCE ADMIN	45	139,855	795	15	$10,553	7	6	6	23	42	$10,512	$6,408	$16,920	$94,737	5.60	1.60
8370	VEH MNT SHOP ORG	13	68,566	1,125	6	$7,933	9	11	4	29	53	$11,181	$2,010	$13,191	$73,007	5.53	1.66
7220	CO HQ BLDG	56	59,504	563	14	$6,550	11	4	8	23	46	$9,553	$1,073	$10,626	$58,802	5.53	1.62
7109	BN ADMIN & CLRM	91	193,078	235	22	$11,789	8	3	9	19	39	$10,834	$8,250	$19,084	$103,521	5.42	1.62
0812	ADMIN & SUPPORT BLD	10	78,701	790	6	$6,896	8	5	3	30	46	$9,854	$1,852	$11,706	$62,893	5.37	1.70
0301	FINANCE ADMIN	89	243,190	1,108	31	$17,627	9	13	11	47	80	$18,287	$12,488	$30,775	$157,433	5.12	1.75
7033	BN HQ BLDG	3	40,044	199	4	$2,648	3	3	2	9	17	$3,559	$1,128	$4,687	$23,819	5.08	1.77
7656	GEN INST BLDG	79	79,637	509	21	$7,898	7	16	8	27	58	$12,328	$1,898	$14,226	$70,291	4.94	1.80
0833	AIRCRAFT HANGAR	9	92,061	432	16	$6,205	10	8	6	24	48	$9,439	$1,852	$11,291	$55,655	4.93	1.82
0810	ADMIN & SUPPLY BLDG	15	67,888	508	9	$5,489	8	4	4	26	42	$9,079	$1,052	$10,131	$49,614	4.90	1.85
7654	ENL PERS DIN	77	79,101	702	18	$8,567	10	10	9	41	70	$12,256	$3,658	$15,914	$76,784	4.82	1.86
0313	CIV PERS BLDG	14	16,769	84	3	$1,481	2	2	1	4	9	$1,688	$1,128	$2,816	$13,150	4.67	1.90

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0727	MNT HANGAR COMB	35	106,473	774	17	$8,895	14	8	13	32	67	$15,254	$1,964	$17,218	$80,164	4.66	1.94
0806	COMB AC-HTG PLANT	134	17,013	18	20	$4,662	16	0	10	14	40	$7,546	$1,052	$8,598	$40,015	4.65	1.84
7739	MVNG TRGT SIM BLDG	17	48,916	311	15	$4,092	5	8	5	15	33	$6,765	$1,164	$7,929	$36,688	4.63	1.94
7622	BN ADMIN & CLRM	53	143,225	433	23	$9,608	7	24	8	38	77	$16,451	$2,010	$18,461	$85,214	4.62	1.92
7432	ADMIN & SUPPORT BLD	19	65,480	540	8	$5,596	10	5	6	27	48	$9,942	$1,164	$11,106	$50,636	4.56	1.98
0804	RGT HQ BUILD	14	52,305	116	8	$3,179	2	7	2	13	24	$5,256	$1,052	$6,308	$28,135	4.46	1.98
8065	CLINIC W/O BEDS	1	38,471	436	8	$3,605	3	9	3	14	29	$6,390	$1,034	$7,424	$32,946	4.44	2.06
7034	CLINIC W/O BEDS	0	36,882	363	9	$3,234	2	8	4	12	26	$5,524	$1,128	$6,652	$29,465	4.43	2.06
7410	BN ADMIN & CLRM	37	84,221	337	13	$6,124	5	4	6	19	34	$7,750	$4,593	$12,343	$54,493	4.41	2.02
0751	AC PTS & TOE ST	3	12,986	350	7	$2,226	4	2	5	7	18	$3,916	$764	$4,680	$20,562	4.39	2.10
7604	GEN INST BLDG	78	86,059	467	21	$7,974	8	19	8	33	68	$14,444	$1,964	$16,408	$70,837	4.32	2.06
6918	SKILL DEV CTR	0	108,121	1,115	0	$9,059	9	24	0	49	82	$17,276	$2,010	$19,286	$82,985	4.30	2.13
8021	ADMIN & SUPPORT BLD	3	53,799	618	3	$4,919	7	6	2	29	44	$9,545	$1,034	$10,579	$45,056	4.26	2.15
7858	ADMIN & SUPPORT BLD	12	18,344	161	7	$1,897	3	0	4	5	12	$2,878	$1,164	$4,042	$17,033	4.21	2.13
0610	ENL BARRACKS W/AS	131	2,030	4	12	$3,721	8	1	5	15	29	$6,275	$1,347	$7,622	$31,774	4.17	2.05
7245	ENL PERS DIN	18	76,912	654	17	$6,730	8	11	6	42	67	$11,884	$2,833	$14,717	$60,899	4.14	2.19
7520	VEH MNT SHOP ORG	0	48,512	1,250	0	$7,152	11	15	2	40	68	$14,579	$1,873	$16,452	$66,651	4.05	2.30
0253	DRUG ABUSE CTR	46	117,379	1,005	14	$10,498	13	21	7	55	96	$20,572	$2,947	$23,519	$94,900	4.04	2.24
7606	ENL PERS DIN	71	66,215	641	18	$7,614	10	11	9	44	74	$13,365	$3,829	$17,194	$68,273	3.97	2.26
7636	REGIMENTAL HQ BLDG	29	46,217	131	11	$3,447	7	2	7	14	30	$6,551	$1,210	$7,761	$30,421	3.92	2.25
0003	POST CHAPEL	1	21,908	271	7	$2,201	4	3	4	9	20	$4,007	$1,128	$5,135	$20,118	3.92	2.33
8023	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,034	$10,579	$41,064	3.88	2.37
8059	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,128	$10,673	$41,064	3.85	2.39
8057	ADMIN & SUPPORT BLD	2	43,522	618	3	$4,459	7	6	2	29	44	$9,545	$1,128	$10,673	$41,034	3.84	2.39
0006	POST CHAPEL	7	44,244	356	7	$3,649	6	8	3	19	36	$7,506	$1,128	$8,634	$33,047	3.83	2.37
0404	ENL BARRACKS W/DAS	108	34,513	322	15	$5,875	9	9	9	30	57	$11,809	$1,834	$13,643	$51,798	3.80	2.32
0840	VEHICLE MNT SHOP OR	8	44,131	317	7	$3,488	7	5	4	19	35	$7,337	$1,052	$8,389	$31,517	3.76	2.40
7900	VEH MNT SHOP ORG	0	55,902	965	0	$6,285	11	15	2	40	68	$14,579	$1,098	$15,677	$58,165	3.71	2.49
7500	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,873	$16,452	$60,667	3.69	2.51
7450	REGIMENTAL HQ BLDG	29	39,781	121	11	$3,138	6	3	6	14	29	$6,437	$1,073	$7,510	$27,677	3.69	2.39
7720	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,964	$16,543	$60,667	3.67	2.53
7940	VEH MNT SHOP ORG	0	48,512	1,018	0	$6,200	11	15	2	40	68	$14,579	$1,210	$15,789	$57,579	3.65	2.55
7350	VEH MNT SHOP ORG	0	51,715	1,034	0	$6,395	11	15	2	40	68	$14,579	$1,873	$16,452	$59,342	3.61	2.57
7960	VEH MNT SHOP ORG	0	55,902	920	0	$6,100	11	15	2	40	68	$14,579	$1,210	$15,789	$56,405	3.57	2.59
8020	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
8010	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
7802	ADMIN & SUPPORT BLD	12	18,344	161	11	$1,993	3	0	6	8	17	$4,044	$1,098	$5,142	$17,852	3.47	2.58
0207	CAVALRY MUSEUM	28	119,303	670	46	$9,499	16	24	13	55	108	$22,425	$2,069	$24,494	$85,016	3.47	2.58
7826	CLINIC W/O BEDS	8	23,854	324	12	$2,824	4	8	4	14	30	$6,195	$1,210	$7,405	$25,673	3.47	2.62
8046	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8056	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8340	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8320	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8300	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70

BLDG NO	BLDG NAME	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
7028	BN CLASSROOMS	2	34,535	67	7	$1,932	4	0	4	9	17	$4,074	$1,128	$5,202	$17,115	3.29	2.69
7760	VEH MNT SHOP ORG	0	49,203	878	0	$5,650	11	15	2	40	68	$14,579	$1,898	$16,477	$52,320	3.18	2.92
7031	BN HQ BLDG	1	30,981	66	7	$1,755	2	0	4	9	15	$3,797	$1,128	$4,925	$15,561	3.16	2.81
7626	CLINIC W/O BEDS	10	28,096	311	13	$3,009	5	8	6	16	35	$7,433	$1,210	$8,643	$27,240	3.15	2.87
7808	ADMIN & SUPPORT BLD	14	23,079	164	14	$2,308	4	0	7	12	23	$5,462	$1,098	$6,560	$20,602	3.14	2.84
7036	REGIMENTAL HQ BLDG	2	47,024	74	4	$2,406	5	2	4	13	24	$5,713	$1,128	$6,841	$21,312	3.12	2.84
7780	VEH MNT SHOP ORG	0	55,902	791	0	$5,568	11	15	2	40	68	$14,579	$1,898	$16,477	$51,328	3.12	2.96
7834	REGIMENTAL HQ BLDG	28	28,924	32	11	$2,299	4	0	7	11	22	$5,278	$1,210	$6,488	$20,041	3.09	2.82
0720	AF OPS BLDG	15	26,324	245	9	$2,705	6	8	3	18	35	$6,805	$1,164	$7,969	$24,352	3.06	2.95
7852	ADMIN & SUPPORT BLD	19	25,600	164	18	$2,644	5	0	9	14	28	$6,557	$1,164	$7,721	$23,498	3.04	2.92
7046	BN CLASSROOMS	2	30,324	66	7	$1,755	4	0	4	9	17	$4,074	$1,073	$5,147	$15,559	3.02	2.93
0402	ENL BARRACKS W/AS	79	38,560	322	23	$5,476	6	21	9	36	72	$15,207	$1,034	$16,241	$48,433	2.98	2.97
7047	BN HQ BLDG	1	28,238	66	7	$1,630	2	0	4	9	15	$3,797	$1,073	$4,870	$14,467	2.97	2.99
0364	UEMCS HQ	3	6,221	118	3	$878	2	2	1	4	9	$1,688	$1,128	$2,816	$8,040	2.86	3.21
7048	BN HQ BLDG	1	26,812	46	7	$1,500	2	0	4	9	15	$3,797	$1,073	$4,870	$13,257	2.72	3.25
7215	BN HQ BLDG	7	23,136	1	10	$1,390	3	2	4	8	17	$3,424	$1,073	$4,497	$12,101	2.69	3.24
7305	APP INSTR BLDG	16	21,606	369	12	$3,109	8	12	4	24	48	$9,436	$1,073	$10,509	$28,264	2.69	3.38
7648	ENL BARRACKS W/O DI	131	18,018	838	51	$8,748	12	42	17	60	131	$27,848	$1,898	$29,746	$78,256	2.63	3.40
7646	ENL BARRACKS W/O DI	124	18,018	838	42	$8,369	9	42	14	60	125	$26,690	$1,898	$28,588	$75,022	2.62	3.42
7650	ENL BARRACKS W/O DI	122	17,840	838	42	$8,306	9	42	14	60	125	$26,690	$1,898	$28,588	$74,484	2.61	3.44
0410	ENL BARRACKS W/AS	88	45,848	206	26	$5,596	8	22	11	41	82	$18,089	$1,034	$19,123	$49,051	2.57	3.42
7644	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$1,898	$28,588	$73,092	2.56	3.51
7642	ENL BARRACKS W/O DI	115	17,840	838	42	$8,128	9	42	14	60	125	$26,690	$1,898	$28,588	$72,970	2.55	3.52
7618	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$2,069	$28,759	$73,092	2.54	3.53
5309	GUEST HOUSE	45	875	7	15	$1,569	4	0	9	6	19	$4,048	$1,347	$5,395	$13,420	2.49	3.44
7243	ADMIN & SUPPORT BLD	0	30,837	120	13	$2,089	8	1	6	14	29	$6,518	$1,073	$7,591	$18,629	2.45	3.63
0227	ENL BARRACKS W/AS	77	43,122	291	22	$5,461	9	20	11	44	84	$17,517	$2,147	$19,664	$48,225	2.45	3.60
0214	ENL BARRACKS W/AS	81	45,379	288	27	$5,770	13	21	11	47	92	$18,822	$2,147	$20,969	$50,875	2.43	3.63
7848	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
7844	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
8025	BN ADMIN & CLRM	5	94,052	4	21	$4,527	5	25	5	37	72	$15,592	$1,834	$17,426	$39,607	2.27	3.85
7850	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7846	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7842	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
0223	ENL BARRACKS W/DAS	96	40,608	365	33	$6,430	13	29	12	54	108	$23,175	$2,147	$25,322	$56,767	2.24	3.94
8037	BN ADMIN & CLRM	5	93,519	4	21	$4,505	6	25	6	36	73	$15,794	$1,928	$17,722	$39,413	2.22	3.93
5000	FIRE STATION	8	5,161	269	12	$1,826	3	8	4	16	31	$6,408	$1,347	$7,755	$16,735	2.16	4.25
0723	MNT HANGAR COMB	0	8,374	431	10	$2,363	7	3	8	18	36	$9,163	$1,164	$10,327	$22,021	2.13	4.37
8044	APP INSTR BLDG	9	6,611	105	3	$1,006	3	4	1	8	16	$3,133	$1,128	$4,261	$9,078	2.13	4.24
0411	ENL BARRACKS W/AS	84	45,856	191	28	$5,500	9	28	12	51	100	$21,870	$1,834	$23,704	$48,176	2.03	4.31
0409	ENL BARRACKS W/AS	84	45,856	191	31	$5,572	9	29	12	52	102	$22,326	$1,834	$24,160	$48,791	2.02	4.34
7818	ENL BARRACKS W/O DI	85	4,701	98	27	$3,424	10	4	13	31	58	$12,794	$1,898	$14,692	$29,658	2.02	4.29
0540	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32
0542	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32

BLDG NO	BLDG NAME	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
7816	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7812	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7616	ENL BARRACKS W/AS	82	4,634	99	27	$3,339	10	4	13	31	58	$12,794	$2,069	$14,863	$28,936	1.95	4.45
0211	ADMIN	3	15,902	125	17	$1,661	5	6	7	14	32	$6,474	$1,269	$7,743	$14,847	1.92	4.66
7810	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7814	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7614	ENL BARRACKS W/AS	78	4,634	99	27	$3,229	10	4	13	31	58	$12,794	$2,069	$14,863	$27,993	1.88	4.60
0710	TAC EQUIP SHOP	5	14,809	118	7	$1,396	6	3	4	13	26	$5,505	$1,164	$6,669	$12,543	1.88	4.78
0512	SR ENL QTRS	39	2,786	17	11	$1,455	5	3	7	12	27	$5,692	$1,034	$6,726	$12,510	1.86	4.62
7612	ENL BARRACKS W/AS	76	4,634	99	27	$3,183	10	4	13	31	58	$12,794	$2,069	$14,863	$27,604	1.86	4.67
0650	COLD STOR FAC	0	0	0	34	$816	0	0	0	13	13	$2,452	$1,347	$3,799	$6,960	1.83	4.66
0541	OFF QTRS MILIT	40	700	7	18	$1,516	3	0	8	16	27	$6,263	$1,034	$7,297	$12,971	1.78	4.81
7658	ADMIN & SUPPORT BLD	16	20,505	169	11	$2,220	8	10	6	26	50	$10,442	$1,098	$11,540	$19,847	1.72	5.20
7610	ENL BARRACKS W/AS	63	4,459	99	27	$2,849	10	4	13	31	58	$12,794	$2,069	$14,863	$24,754	1.67	5.22
0652	COLD STOR FAC	0	0	0	18	$432	0	0	0	5	5	$979	$1,347	$2,326	$3,685	1.58	5.38
7050	ENL BARRACKS W/AS	21	18,887	78	25	$2,231	6	4	12	30	52	$11,634	$1,073	$12,707	$19,551	1.54	5.69
7404	ENL BARRACKS W/O DI	8	29,731	18	24	$2,089	5	14	9	24	52	$10,997	$1,073	$12,070	$18,200	1.51	5.78
7424	ENL BARRACKS W/O DI	8	28,331	5	24	$1,975	5	14	9	24	52	$10,997	$1,073	$12,070	$17,159	1.42	6.11
7652	ADMIN & SUPPORT BLD	16	20,505	6	11	$1,546	8	10	6	26	50	$10,442	$1,098	$11,540	$13,418	1.16	7.47
7176	MOTOR POOL MNT SHO	0	2,048	42	4	$354	2	0	4	3	9	$2,228	$728	$2,956	$3,217	1.09	8.34
7602	ADMIN & SUPPORT BLD	15	18,220	6	11	$1,422	8	10	6	26	50	$10,442	$1,269	$11,711	$12,344	1.05	8.23
7608	ADMIN & SUPPORT BLD	15	16,655	6	11	$1,358	8	10	6	26	50	$10,442	$1,164	$11,606	$11,777	1.01	8.55
0027	OFF QTRS MILIT	6	0	5	14	$500	2	0	6	6	14	$3,104	$1,128	$4,232	$4,282	1.01	8.47
7053	ENL BARRACKS W/AS	7	0	25	21	$773	3	0	9	15	27	$6,068	$1,073	$7,141	$6,696	0.94	9.24
8006	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8002	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8042	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8038	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8052	SR ENL QTRS	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
0621	OFF QTRS TRANS	0	4,800	2	0	$208	1	1	1	3	6	$1,495	$1,347	$2,842	$1,829	0.64	13.69
0760	BN HQ BLDG	0	0	0	7	$168	1	1	3	2	7	$1,471	$764	$2,235	$1,433	0.64	13.30
8012	ENL BARRACKS W/O DI	5	0	4	3	$205	1	1	1	7	10	$2,527	$1,034	$3,561	$1,764	0.50	17.37
8008	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8014	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8050	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8048	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8040	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8054	ENL BARRACKS W/O DI	2	0	2	3	$124	1	1	1	7	10	$2,527	$1,128	$3,655	$1,069	0.29	29.38
7178	MOTOR POOL ADMIN	0	676	7	0	$57	2	0	2	4	8	$2,426	$728	$3,154	$521	0.17	55.46
0620	OFF QTRS MILIT	0	0	2	0	$9	0	1	0	3	4	$1,109	$1,347	$2,456	$89	0.04	263.63

BLDG NO	BLDG NAME	KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK

TOT. kW SVGS	TOT. kWH SVGS	TOT. MBtu	TOT. LBR HR SVGS	TOT. CST SVGS	TOT. BLDG PNTS	TOT. SYS HARDWR CST	TOT. RCU/ ACU	TOT. HARDWR COST	TOT. DISC SAVINGS
7,582	17,108,240	153,433	2,941	1,602,487	9,914	2,130,927	370,167.00	2,501,094	14,477,998

TOT DO PNTS	TOT AO PNTS	TOT DI PNTS	TOT AI PNTS
1,531	1,897	1,310	5,176

TOTAL FOR NON-QUALIFYING BUILDINGS (SIRs less than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
111	62,904	137	115	$8,819	47	45	55	198	345	$79,551	$23,185	$103,263	$76,454

TOTAL FOR QUALIFYING BUILDINGS (SIRs greater than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,255	4,978	9,569	$2,051,376	$346,982	$2,397,831	$14,401,544
	(Water Level Alarms in Basement MERs)						71		71	$11,147		$11,147	
	(Pneumatic Control Air Monitoring)						112		112	$11,984		$11,984	
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,438	4,978	9,752	$2,074,507	$346,982	$2,420,962	$14,401,544

ENERGY SAVINGS

Table ES-2 below summarizes the potential energy savings for the proposed UMCS configuration. Column A of this table lists the energy savings for the buildings analyzed for the proposed UMCS. Column B lists the energy usage and energy costs incurred at Fort Riley in FY94. Column C lists the percent savings predicted for the proposed UMCS configuration.

Table ES- 2. Energy Savings Summary

	(A) Annual Energy Savings	(B) Current Energy Usage	(C) % Savings (A)/(B)
Proposed UMCS Electricity (kWh)	17,045,336	169,353,256	10.1%
Proposed UMCS Nat. Gas (MBtu)	153,296	1,244,183	12.3%

IMPLEMENTATION COSTS

The listing of implementation costs and total anticipated contract costs for the proposed UMCS are presented in Table ES-3 on page ES-10.

Table ES- 3. Implementation Costs

	Proposed UMCS (1995 $)
UMCS Software/Database	$ 144,580
Central UMCS Hardware	109,008
Training	73,110
Documentation and Submittals	50,000
Testing	197,908
Total Field Hardware	2,420,962
Fiber Optic DTM	544,847
ACM Removal	15,567
RF System	49,619
FO and UMCS Equip. for Gas Meter Monitoring	17,368
SUBTOTAL	$3,622,969
Overhead (15%)	543,445
Bond (2.5%)	104,160
Profit (10%)	427,057
Contingency (10%)	469,763
ANTICIPATED CONTRACT COSTS	$5,167,394
S&A (7.0%)	$361,718
DESIGN (6.0%)	$310,044
TOTAL INVESTMENT	**$5,839,156**

SUMMARY

Table ES-4 below presents the economic summary of the proposed UMCS.

Table ES-4. System Economics

	Proposed UMCS (1995 $)
Total Investment, Per ECIP Guidance ($)	5,839,156
Annual Savings (MBtu)	211,472
First Year Energy Savings ($)	1,335,506
First Year Maintenance Manhours Savings ($)	67,824
First Year Electrical Demand Savings ($)	190,361
First Year Maintenance Cost ($)	(116,206)
Total Non-Energy Annual Recurring Savings ($)	(48,382)
Net First Year Savings ($)	1,477,485
Net Discounted Savings ($)	13,410,508
Simple Payback (years)	3.95
SIR	2.30

The proposed UMCS configuration has a simple payback of 3.95 years and a SIR of 2.30. The proposed UMCS will save 10.1% on electrical energy and 12.3% on natural gas energy.

RECOMMENDATIONS

It is recommended that the proposed UMCS be installed to control and monitor systems in 190 buildings, including replacement of the existing field hardware in the original 23 buildings. The UMCS should consist of a state-of-the-art PC-based front-end central operator station, field panels, field hardware control devices, and control wiring as outlined in the latest Corps of Engineer Guide Specification for Utility Monitoring and Control System, CEGS-16935.

It is recommended that a new data transmission system, consisting of contractor-installed underground FO cable be provided for all data communication needs to the 190 buildings recommended for the UMCS.

FORT RILEY SUPPORT

To be cost effective, the UMCS will need strong support from Fort Riley. If the UMCS is not supported, large sums of money may be spent on an UMCS that never meets the Fort Riley cost savings goals. The cost effectiveness of an UMCS depends on several factors, including the following:

- Proper training and motivation of operators to use a large, expensive UMCS.

- Coordination between UMCS operations and Fort Riley Public Works personnel, contractors, and others, to reduce wasted materials and labor, and duplication of effort.

- Basic training of shops personnel to assure their activities do not excessively hinder UMCS operations. Education will enable shops personnel to use the UMCS in their operation and maintenance (O&M) and utilities areas and thereby improve overall cost effectiveness.

- High priority of funding for UMCS maintenance in order to keep the system in good operating condition.

- Staffing requirements for operation and maintenance of the UMCS determined by Fort Riley Public Works.

- Periodic verification and validation of energy and O&M cost savings to ensure that the UMCS is performing as planned.

If successfully implemented, the UMCS can assist all personnel in carrying out their missions. The UMCS can save energy, predict equipment failure, detect equipment failure quickly, and schedule preventive maintenance. Significant potential for cost avoidance exists at Fort Riley if UMCS administration, operations, and maintenance activities are properly planned and implemented, and if the UMCS is used to its full capability.